

This listing of claims will replace all prior versions, and listings, of claims in the application:

1 Claim 1 (currently amended): For use with a node, a  
2 method comprising:  
3 a) accepting, using the node, status information  
4 from at least two different kinds of routing  
5 protocols;  
6 b) composing, using the node, an aggregated message  
7 including at least two indicators, each indicator  
8 identifying a different one of the at least two  
9 different kinds of routing protocols and the  
10 corresponding status information from each of the at  
11 least two different kinds of routing protocols as  
12 data within the aggregated message; and  
13 c) sending, using the node, the aggregated message  
14 towards a neighbor node.

1 Claim 2 (previously presented): The method of claim 1  
2 further comprising:  
3 d) maintaining, using the node, a first timer for  
4 tracking a send time interval, wherein the acts of  
5 composing the aggregated message and sending the  
6 aggregated message are performed after expiration of  
7 the first timer; and  
8 e) restarting, using the node, the first timer  
9 after the aggregated message is sent.

1 Claim 3 (previously presented): The method of claim 2  
2 wherein the aggregated message further includes a dead  
3 time interval, and wherein the send time interval is less  
4 than the dead time interval.

1 Claim 4 (previously presented): The method of claim 2  
2 wherein the aggregated message further includes a dead  
3 time interval, and wherein the send time interval is no  
4 more than one third of the dead time interval.

1 Claim 5 (original): The method of claim 2 wherein the  
2 send time interval is less than one second.

1 Claim 6 (original): The method of claim 2 wherein the  
2 send time interval is less than 100 msec.

1 Claim 7 (previously presented): The method of claim 1  
2 wherein the aggregated message further includes a dead  
3 time interval.

1 Claim 8 (previously presented): The method of claim 1  
2 wherein the act of sending the aggregated message  
3 includes providing the aggregated message in an Internet  
4 protocol packet.

1 Claim 9 (previously presented): The method of claim 8  
2 wherein the act of sending the aggregated message towards  
3 the neighbor node includes setting a destination address  
4 in the Internet protocol packet to a multicast address  
5 associated with routers that support aggregated protocol  
6 liveness.

1 Claim 10 (currently amended): The method of claim 1  
2 wherein the neighbor node has at least one routing  
3 protocol peering with at least one of the at least two  
4 routing protocols.

1 Claim 11 (currently amended): The method of claim 1  
2 wherein the status information includes a routing  
3 protocol state selected from a group of routing protocols  
4 states consisting of (A) protocol up, (B) protocol down,  
5 (C) protocol not reporting, and (D) protocol restarting.

1 Claim 12 (currently amended): For use with a node, a  
2 method comprising:  
3 a) receiving, using the node, an aggregated message  
4 including  
5 i) for a first set of at least two different  
6 kinds of routing protocols of a neighbor node,  
7 at least two indicators, each indicator  
8 identifying a different one of the at least two  
9 different kinds of routing protocols and  
10 corresponding status information for each of  
11 the protocols of the first set of the at least  
12 two different kinds of routing protocols as  
13 data within the aggregated message, and  
14 ii) a time interval; and  
15 b) updating, using the node, neighbor node protocol  
16 status information using the aggregated message.

1 Claim 13 (currently amended): The method of claim 12  
2 wherein the act of updating neighbor node protocol status  
3 information includes  
4 i) setting, using the node, a first timer to  
5 the time interval and starting the first timer,  
6 ii) if the first timer expires, setting, using  
7 the node, the status of each of the protocols  
8 of the neighbor node to down, and

9           iii) if a further message, sourced from the  
10 neighbor node, and including  
11           A) for a second set of at least two  
12 protocols, at least two indicators, each  
13 indicator identifying the at least two  
14 routing protocols and corresponding status  
15 information for each of the routing  
16 protocols of the second set, and  
17           B) a new time interval,  
18 is received then, resetting, using the node,  
19 the first timer to the new time interval and  
20 restarting the first timer.

1 Claim 14 (original): The method of claim 13 wherein each  
2 of the time interval and the new time interval is less  
3 than one second.

1 Claim 15 (currently amended): The method of claim 12  
2 wherein the status information includes a routing  
3 protocol state selected from a group of routing protocols  
4 states consisting of (A) protocol up, (B) protocol down,  
5 (C) protocol not reporting, and (D) protocol restarting.

1 Claim 16 (currently amended): The method of claim 13  
2 wherein the act of updating neighbor node routing  
3 protocol status information further includes  
4           iv) if the further message is received then,  
5 in addition to resetting the first timer to the  
6 new time interval and restarting the first  
7 timer, further  
8           A) determining, using the node, whether  
9 the first set of at least two routing

10 protocols is the same as the second set of  
11 at least two routing protocols,  
12 B) if the first set of at least two  
13 routing protocols is determined to be the  
14 same as the second set of at least routing  
15 two protocols, then for each of the at  
16 least two routing protocols of both the  
17 first and second sets having a changed  
18 status, informing, using the node, a  
19 locally running instance of the routing  
20 protocol of the changed status of its peer  
21 routing protocol of the neighbor node, and  
22 C) if the first set of at least two  
23 routing protocols is determined to be  
24 different from the second set of at least  
25 two routing protocols, then  
26 1) for any routing protocol in the  
27 second set but not in the first set,  
28 informing, using the node, a locally  
29 running instance of the routing  
30 protocol of the status indicated in  
31 the further message of its peer  
32 routing protocol of the neighbor  
33 node, and  
34 2) for any routing protocol in the  
35 first set but not in the second set,  
36 informing, using the node, a locally  
37 running instance of the routing  
38 protocol that the status of its peer  
39 routing protocol of the neighbor node  
40 is down.

1 Claim 17 (currently amended): The method of claim 16,  
2 wherein each of the aggregated message and the further  
3 message include an indication of a relative message age,  
4 and wherein the act of updating neighbor node rcuting  
5 protocol status information includes,  
6       iv) if the further message is received then,  
7       in addition to resetting the first timer to the  
8       new time interval and restarting the first  
9       timer, further  
10       A) determining, using the node, whether  
11       the further message is younger than the  
12       aggregated message, and  
13       B) if it is determined that the further  
14       message is not younger than the aggregated  
15       message, then discarding, using the node,  
16       the further message.

1 Claim 18 (currently amended): The method of claim 13  
2 wherein each of the aggregated message and the further  
3 message include an indication of a relative message age,  
4 and wherein the act of updating neighbor node rcuting  
5 protocol status information includes,  
6       iv) if the further message is received then,  
7       in addition to resetting the first timer to the  
8       new time interval and restarting the first  
9       timer, further  
10       A) determining, using the node, whether  
11       the further message is younger than the  
12       aggregated message, and  
13       B) if it is determined that the further  
14       message is not younger than the aggregated

15 message, then discarding, using the node,  
16 the further message.

1 Claim 19 (currently amended): A method for monitoring  
2 liveness of multiple protocols, the method comprising:  
3 a) determining, at a first node, status information  
4 for at least two different kinds of routing  
5 protocols;  
6 b) sending, from the first node, an aggregated  
7 message including at least two indicators, each  
8 indicator identifying a different one of the at  
9 least two different kinds of routing protocols and  
10 the corresponding determined status information for  
11 the at least two different kinds of routing  
12 protocols as data within the aggregated message to a  
13 second node;  
14 c) receiving, at the second node, the aggregated  
15 message; and  
16 d) updating, by the second node, first node routing  
17 protocol status information using the aggregated  
18 message.

1 Claim 20 (currently amended): The method of claim 19  
2 wherein the aggregated message further includes a first  
3 time interval, and wherein the act of updating neighbor  
4 node routing protocol status information includes:  
5 i) setting a timer to the first time interval;  
6 ii) starting the timer;  
7 iii) determining whether or not a further  
8 message including routing protocol status  
9 information is received from the first node by

10 the second node before the expiration of the  
11 timer; and  
12 iv) if it is determined that a further message  
13 including routing protocol status information  
14 is not received from the first node by the  
15 second node before the expiration of the timer,  
16 then informing peer routing protocols of the  
17 second node that the at least two routing  
18 protocols of the first node are down.

1 Claim 21 (currently amended): The method of claim 19  
2 wherein the status information includes a routing  
3 protocol state selected from a group of protocols states  
4 including at least (A) protocol up, (B) protocol down,  
5 (C) protocol not reporting, and (D) protocol restarting.

1 Claim 22 (currently amended): A machine-readable medium  
2 having stored thereon a machine readable aggregated  
3 message comprising:  
4 a) at least two indicators, each indicator  
5 identifying a different one of at least two  
6 different kinds of routing protocols of a node  
7 stored as data within the aggregated message;  
8 b) status information, for the at least two  
9 different kinds of routing protocols of [[a]] the  
10 node, of a state of each of the at least two routing  
11 protocols stored as data within the aggregated  
12 message; and  
13 c) [[b]] a dead interval.

1 Claim 23 (currently amended): The machine-readable  
2 medium of claim 22 wherein the status information:

3 indicates a routing protocol state selected from a group  
4 of protocols states consisting of (A) protocol up, (B)  
5 protocol down, (C) protocol not reporting, and (D)  
6 protocol restarting.

1 Claim 24 (original): The machine-readable medium of  
2 claim 22 further comprising:  
3 c) an identifier of the node.

1 Claim 25 (original): The machine-readable medium of  
2 claim 24 wherein the node is a router and wherein the  
3 identifier is a router identifier.

1 Claim 26 (original): The machine-readable medium of  
2 claim 22 further comprising:  
3 c) an interface index.

1 Claim 27 (currently amended): For use with a node,  
2 apparatus comprising:  
3 a) at least one processor;  
4 b) at least one input device; and  
5 c) at least one storage device storing  
6 processor-executable instructions which, when  
7 executed by one or more processors, perform a method  
8 including  
9 i) accepting status information from at least  
10 two different kinds of routing protocols,  
11 ii) composing, using the node, an aggregated  
12 message including at least two indicators, each  
13 indicator identifying a different one of the at  
14 least two different kinds of routing protocols  
15 and the corresponding status information from

16           each of the at least two different kinds of  
17           routing protocols as data within the aggregated  
18           message, and  
19           iii) sending the aggregated message towards a  
20           neighbor node.

1   Claim 28 (previously presented): The apparatus of claim  
2   27 wherein the method further includes

3           iv) maintaining a first timer for tracking a send  
4           time interval, wherein the act of composing the  
5           aggregated message and sending the aggregated  
6           message compose and send the aggregated message  
7           after expiration of the first timer, and  
8           v) restarting the first timer after the aggregated  
9           message is sent.

1   Claim 29 (previously presented): The apparatus of claim  
2   28 wherein the aggregated message further includes a dead  
3   time interval, and wherein the send time interval is less  
4   than the dead time interval.

1   Claim 30 (previously presented): The apparatus of claim  
2   28 wherein the aggregated message further includes a dead  
3   time interval, and wherein the send time interval is no  
4   more than one third of the dead time interval.

1   Claim 31 (previously presented): The apparatus of claim  
2   28 wherein the send time interval is less than one  
3   second.

1   Claim 32 (previously presented): The apparatus of claim  
2   28 wherein the send time interval is less than 100 msec.

1 Claim 33 (previously presented): The apparatus of claim  
2 27 wherein the aggregated message further includes a dead  
3 time interval.

1 Claim 34 (previously presented): The apparatus of claim  
2 27 wherein the act of sending the aggregated message  
3 includes providing the aggregated message in an Internet  
4 protocol packet.

1 Claim 35 (currently amended): The apparatus of claim 34  
2 wherein the act of sending the aggregated message  
3 includes setting a destination address in the Internet  
4 protocol packet to a multicast address associated with  
5 routers that support aggregated routing protocol  
6 liveness.

1 Claim 36 (previously presented): The apparatus of claim  
2 27 wherein the neighbor node has at least one protocol  
3 peering with at least one of the at least two protocols.

1 Claim 37 (currently amended): The apparatus of claim 27  
2 wherein the status information includes a routing  
3 protocol state selected from a group of protocol states  
4 consisting of (A) protocol up, (B) protocol down (C)  
5 protocol not reporting, and (D) protocol restarting.

1 Claim 38 (currently amended): For use with a node,  
2 apparatus comprising:  
3 a) at least one processor;  
4 b) at least one input device; and  
5 c) at least one storage device storing  
6 processor-executable instructions which, when

7       executed by one or more processors, perform a method  
8       including  
9       i) receiving, using the at least one input, an  
10      aggregated message including  
11         A) . for a first set of at least two  
12         different kinds of routing protocols of a  
13         neighbor node, at least two indicators each  
14         indicator identifying a different one of the at  
15         least two different kinds of routing protocols  
16         and corresponding status information for each  
17         of the protocols of the first set of the at  
18         least two different kinds of routing protocols  
19         as data within the aggregated message, and  
20         B) a time interval, and  
21         ii) updating neighbor node protocol status  
22      information using the aggregated message.

1    Claim 39 (currently amended): The apparatus of claim 38  
2    wherein the act of updating neighbor node protocol status  
3    information includes  
4         A) setting a first timer to the time interval  
5         and starting the first timer,  
6         B) setting the status of each of the routing  
7         protocols of the neighbor node to down if the  
8         first timer expires, and  
9         C) if a further message, sourced from the  
10      neighbor node, and including  
11         1) for a second set of at least two  
12         protocols, at least two indicators, each  
13         indicator identifying the at least two  
14         routing protocols and corresponding status

15 information for each of the routing  
16 protocols of the second set, and  
17 2) a new time interval,  
18 is received, resetting the first timer to the  
19 new time interval and restarting the first  
20 timer.

1 Claim 40 (previously presented): The apparatus of claim  
2 39 wherein each of the time interval and the new time  
3 interval is less than one second.

1 Claim 41 (currently amended): The apparatus of claim 38  
2 wherein the status information includes a routing  
3 protocol state selected from a group of protocols: states  
4 consisting of (A) protocol up, (B) protocol down, (C)  
5 protocol not reporting, and (D) protocol restarting.

1 Claim 42 (currently amended): The apparatus of claim 39  
2 wherein the act of updating neighbor node routing  
3 protocol status information further includes  
4 D) determining whether the first set of at  
5 least two routing protocols is the same as the  
6 second set of at least two protocols,  
7 E) if the first set of at least two routing  
8 protocols is determined to be the same as the  
9 second set of at least two routing protocols,  
10 then for each of the at least two routing  
11 protocols of both the first and second sets  
12 having a changed status, informing a locally  
13 running instance of the routing protocol of  
14 the changed status of its peer routing  
15 protocol of the neighbor node, and

16 F) if the first set of at least two routing  
17 protocols is determined to be different from  
18 the second set of at least two routing  
19 protocols,  
20 1) for any routing protocol in the second  
21 set but not in the first set, informing a  
22 locally running instance of the routing  
23 protocol of the status indicated in the  
24 further message of its peer routing  
25 protocol of the neighbor node, and  
26 2) for any routing protocol in the first  
27 set but not in the second set, informing a  
28 locally running instance of the routing  
29 protocol that the status of its peer  
30 routing protocol of the neighbor node is  
31 down.

1 Claim 43 (currently amended): The apparatus of claim 42  
2 wherein each of the aggregated message and the further  
3 message include an indication of a relative message age,  
4 and wherein the act of updating neighbor node routing  
5 protocol status information includes,  
6 D) determining whether the further message is  
7 younger than the aggregated message, and  
8 E) if it is determined that the further  
9 message is not younger than the aggregated  
10 message, then discarding the further message.  
11

1 Claim 44 (currently amended): The apparatus of claim 39  
2 wherein each of the aggregated message and the further  
3 message include an indication of a relative message age,

4 and wherein the act of updating neighbor node routing  
5 protocol status information includes,  
6 D) determining whether the further message is  
7 younger than the aggregated message, and  
8 E) if it is determined that the further  
9 message is not younger than the aggregated  
10 message, then discarding the further message.

1 Claim 45 (currently amended): A system comprising:  
2 a) a first node adapted to  
3 i) determine status information for at least  
4 two different kinds of routing protocols, and  
5 ii) send an aggregated message including at  
6 least two indicators, each indicator  
7 identifying a different one of the at least two  
8 different kinds of routing protocols and the  
9 corresponding determined status information for  
10 the at least two different kinds of routing  
11 protocols as data within the aggregated message  
12 to a second node; and  
13 b) the second node adapted to  
14 i) receive the aggregated message; and  
15 ii) update first node routing protocol status  
16 information using the aggregated message.

1 Claim 46 (currently amended): The system of claim 45  
2 wherein the aggregated message further includes a first  
3 time interval, and wherein the act of updating the first  
4 node routing protocol status information includes  
5 A) setting a timer to the first time  
6 interval;  
7 B) starting the timer;

8 C) determining whether or not a further  
9 message including routing protocol status  
10 information is received from the first  
11 node by the second node before the  
12 expiration of the timer; and  
13 D) if it is determined that a further  
14 message including routing protocol status  
15 information is not received from the first  
16 node by the second node before the  
17 expiration of the timer, then informing  
18 peer routing protocols of the second node  
19 that the at least two routing protocols of  
20 the first node are down.

1 Claim 47 (currently amended): The system of claim 46  
2 wherein the status information includes a routing  
3 protocol state selected from a group of protocols states  
4 including at least (A) protocol up, (B) protocol down,  
5 (C) protocol not reporting, and (D) protocol restarting.

1 Claim 48 (currently amended): The method of claim 1  
2 wherein the status information is local routing protocol  
3 status information.

1 Claim 49 (currently amended): The method of claim 1  
2 wherein the status information is local status  
3 information and wherein each of the at least two  
4 different kinds of routing protocols is ~~[[being]]~~ being  
5 run locally on the node.

1 Claim 50 (currently amended): The method of claim 1  
2 wherein the status information of at least one of the at

3 least two different kinds of routing protocols included  
4 in the aggregated message includes a routing protocol  
5 state set to protocol not reporting.

1 Claim 51 (currently amended): The method of claim 1  
2 wherein the status information of at least one of the at  
3 least two different kinds of routing protocols included  
4 in the aggregated message includes a routing protocol  
5 state set to protocol restarting.

1 Claim 52 (currently amended): The method of claim 12  
2 wherein the status information of at least one of the at  
3 least two different kinds of routing protocols included  
4 in the first set of at least two different kinds of  
5 routing protocols included within the aggregated message  
6 includes a routing protocol state set to protocol not  
7 reporting.

1 Claim 53 (currently amended): The method of claim 12  
2 wherein the status information of at least one of the at  
3 least two different kinds of routing protocols included  
4 in the first set of at least two different kinds of  
5 routing protocols included within the aggregated message  
6 includes a routing protocol state set to protocol  
7 restarting.

1 Claim 54 (new): The method of claim 1 wherein a first  
2 one of the at least two indicators identifies a first  
3 kind of routing protocol from a group of routing  
4 protocols consisting of (A) Border Gateway Protocol  
5 (BGP), (B) Intermediate system to intermediate system  
6 (IS-IS), (C) Open Shortest Path First - Version 2 (OSPF

7 v2), (D) Open Shortest Path First -Version 3 (OSPF v3),  
 8 (E) Routing Information Protocol Version 1/Version 2 (RIP  
 9 v1/v2), (F) Routing Information Protocol next generation  
 10 (RIP-ng), (G) Protocol-Independent Multicast (PIM), (H)  
 11 Distance Vector Multicast Routing Protocol (DVMRP), (I)  
 12 Label Distribution Protocol (LDP), (J) Resource  
 13 Reservation Protocol (RSVP) and (K) Link Management  
 14 Protocol (LMP), and

15 wherein a second one of the at least two indicators  
 16 identifies a second kind of routing protocol, which is  
 17 different from the first kind of routing protocol  
 18 identified, from a group of routing protocols consisting  
 19 of (A) Border Gateway Protocol (BGP), (B) Intermediate  
 20 system to intermediate system (IS-IS), (C) Open Shortest  
 21 Path First - Version 2 (OSPF v2), (D) Open Shortest Path  
 22 First -Version 3 (OSPF v3), (E) Routing Information  
 23 Protocol Version 1/Version 2 (RIP v1/v2), (F) Routing  
 24 Information Protocol next generation (RIP-ng), (G)  
 25 Protocol-Independent Multicast (PIM), (H) Distance Vector  
 26 Multicast Routing Protocol (DVMRP), (I) Label  
 27 Distribution Protocol (LDP), (J) Resource Reservation  
 28 Protocol (RSVP) and (K) Link Management Protocol (LMP).

1 Claim 55 (new): The method of claim 12 wherein a first  
 2 one of the at least two indicators identifies a first  
 3 kind of routing protocol from a group of routing  
 4 protocols consisting of (A) Border Gateway Protocol  
 5 (BGP), (B) Intermediate system to intermediate system  
 6 (IS-IS), (C) Open Shortest Path First - Version 2 (OSPF  
 7 v2), (D) Open Shortest Path First -Version 3 (OSPF v3),  
 8 (E) Routing Information Protocol Version 1/Version 2 (RIP  
 9 v1/v2), (F) Routing Information Protocol next generation

10 (RIP-ng), (G) Protocol-Independent Multicast (PIM), (H)  
11 Distance Vector Multicast Routing Protocol (DVMRP), (I)  
12 Label Distribution Protocol (LDP), (J) Resource  
13 Reservation Protocol (RSVP) and (K) Link Management  
14 Protocol (LMP), and  
15 wherein a second one of the at least two indicators  
16 identifies a second kind of routing protocol, which is  
17 different from the first kind of routing protocol  
18 identified, from a group of routing protocols consisting  
19 of (A) Border Gateway Protocol (BGP), (B) Intermediate  
20 system to intermediate system (IS-IS), (C) Open Shortest  
21 Path First - Version 2 (OSPF v2), (D) Open Shortest Path  
22 First -Version 3 (OSPF v3), (E) Routing Information  
23 Protocol Version 1/Version 2 (RIP v1/v2), (F) Routing  
24 Information Protocol next generation (RIP-ng), (G)  
25 Protocol-Independent Multicast (PIM), (H) Distance Vector  
26 Multicast Routing Protocol (DVMRP), (I) Label  
27 Distribution Protocol (LDP), (J) Resource Reservation  
28 Protocol (RSVP) and (K) Link Management Protocol (LMP).